

REMARKS

After receiving the final Action, telephone interviews were made with the Examiner in April, and discussed claims 1, 4 and 9, and JP4-292239 and USP 5,213,361. As a result of the telephone interviews, it was agreed that if claim 4 is combined with claim 1, claim 1 would be allowable. The allowability of claim 1 has been discussed with the applicant, and it was agreed that claim 4 is combined with claim 1.

In the above situation, the present amendment has been filed. Namely, the subject matter of claim 4 has been entered into claim 1, and claim 4 has been cancelled. Also, claim 5 has been amended to depend from claim 1.

It is believed that the application is now in condition for allowance.

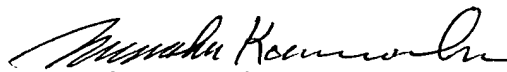
The Examiner's attention on this matter is appreciated.

Now, full translation of Japanese Patent Publication (KOKOKU) No. 29-23176 filed on March 15, 2005 as IDS is obtained. Therefore, the translation of the publication has been filed herewith.

Reconsideration and allowance are earnestly solicited.

Respectfully submitted,

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- 1 -

(54) VEHICLE OCCUPANT PROTECTION AIRBAG APPARATUS

(21) Japanese Patent Application No. 45-83639

(22) Application Date: September 24, 1970

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Brief Description of the Drawings

Fig. 1 is a sectional view showing an embodiment of an apparatus of the present invention.

Fig. 2 is a sectional view showing another embodiment.

Detailed Description of the Invention

The present invention relates to a novel airbag apparatus for protecting vehicle occupants against accidents such as the crash and the like of a vehicle.

In the vehicle occupant protection airbag apparatus of the present invention, when an airbag is inflated, it is configured to have appropriate irregularly inflated portions at necessary positions to receive an occupant's body in a traveling direction and in an obliquely forward direction.

Vehicle airbag apparatuses primitively have an object of safely protecting a vehicle occupant from shock in a traffic accident such as the crash and the like of a vehicle to thereby prevent him or her from being killed and injured.

However, since the bag of a conventional airbag apparatus has a very simple structure, it is configured, when a crash occurs, in a shape simply parallel with a wheel shaft such as a cylindrical shape, a prism shape, a truncated cone shape, and the like. Accordingly, when the direction in which the crash of the vehicle occurs is limited to a traveling direction, even if an occupant gets thrown out in the traveling direction, he or she is received by the airbag apparatus and the shock in the crash is absorbed thereby, and thus there is a possibility that he or she is prevented from being killed or injured. However, the crash of the vehicle is not limited to a head-on crash in the traveling direction, and when the vehicle collides side-on or rolls over, an occupant's body often gets through out in an oblique direction. Recently, when vehicles are driven at a high speed and further traffic systems are made complex, since vehicle accidents and troubles are not limited to head-on crashes and becomes more complex, it is not sufficient to absorb the shock applied to occupants only in the traveling direction.

An object of the present invention is to cope with the drawbacks of the airbag apparatus based on the conventional art in consideration of the various modes of shock in vehicle accidents and to provide a novel airbag capable of effectively receiving the body of an occupant when the

occupant gets thrown out in the oblique direction of a vehicle in addition to that the occupant gets thrown out simply in the traveling direction of the vehicle, absorbing shock, and preventing an occupant from being killed or injured by protecting the body of the occupant.

To explain an embodiment of the present invention for achieving the above object based on drawings, the embodiment has the following arrangement, operation, and working effect.

Fig. 1 is shows the embodiment of the present invention in which a bag is inflated with a gas. In the arrangement of the embodiment, reference numeral 1 denotes a bag main body of an airbag apparatus of the present invention, and the bag main body 1 is composed of an appropriate gas-tight material. Reference numeral 2 denotes the opening of a gas generator connected to the bag 1, and 2' denotes an engagement portion for appropriately connecting the opening to the bag 1. The bag main body 1 is composed of bag elements 1a and 1b disposed in parallel with each other right and left. The bag elements 1a and 1b are coupled with each other within the range of a closed side portion 1c by an appropriate means such as sewing, bonding, and the like. The inside connected portion 1c has an engagement portion 2" on the gas generator side thereof, and the engagement portion 2" is appropriately connected to the gas generator. A guide plate 2a is disposed between the engagement portions

2' and 2" to guide a high pressure gas to the inflating sections 3 and 4 of the bag elements 1a and 1b. Reference numeral 5 denotes a recessed portion formed by coupling the bag elements 1a and 1b with each other through the inside connected portion 1c and acts as a portion for receiving a vehicle occupant. In the figure, A, B, and C show a traveling direction and obliquely forward directions in which an occupant gets thrown out, respectively.

The airbag apparatus having the above bag structure is disposed in front of the vehicle occupant, and the bag main body 1 is deflated in an appropriate shape and accommodated. When the shock of the crash and the like of the vehicle is appropriately detected by a sensor means (not shown), a high pressure gas is instantly ejected from the gas generator 2 in the direction of arrows, passes the guide plate 2a, and fills the right and left bag elements 1a and 1b of the bag main body 1 partitioned by the inside connected portion 1c. As a result, the right and left inflating sections 3 and 4 are formed in a short time, and, at the same time, the inter-inflating-portion recess 5 having the inside connected portion 1c as a base is formed.

When the occupant gets thrown out in a traveling direction A by a crash and the like, the occupant's body is securely received by the recess 5. However, even if the occupant gets thrown out in the oblique direction B or C, he

or she is precisely received by the inflating sections 3 and 4 of the inter-inflating-portion recess 5. As a result, there is an effect in that the occupant's body is not only protected against the crash simply in a forward traveling direction but also protected even if the occupant's body gets thrown out in an oblique direction and thus the occupant can be prevented from being killed or injured.

Next, Fig. 2 shows one of the other embodiments of the present invention in which a bag is inflated by a gas likewise the first embodiment shown in Fig. 1. The main portion of the embodiment is arranged substantially similarly to that shown in Fig. 1 and includes a bag main body 1, the opening 2 of a gas generator opening, and right and left inflating sections 3 and 4 of the bag main body 1. In the embodiment, the bag main body 1 is composed of a single bag 11, and thus right and left inflating sections are not separated by a partition wall. However, an inter-inflating-portion recess 15 is formed to the substrate portion 11 by a suspension rope 16 which is formed from a connecting portion 11b bonded to a pad 11c to a buffer member 17 having a gas guide plate 2a of a generator 2 attached to a support plate 2b. Accordingly, when the bag is filled with the gas, the inter-inflating-portion recess 15 and an annular inflating portion 11a therearound are formed. Although the above arrangement includes the single

suspension rope 16, it is also possible to form the same bag shape as that of the embodiment shown in Fig. 1 by disposing a plurality of the ropes 16 in parallel with each other vertically. On the other hand, it is also possible to apply the embodiment to a broader range to achieve the object of the present invention by, for example, appropriately inflating the bag main body 11 by changing the number of the suspension ropes 16 and the suspending conditions thereof.

When an airbag apparatus, which accommodates the bag main body 1 arranged as described above and deflated in an appropriate shape, is disposed in a vehicle, an appropriate sensor (not shown) detects the various crashes of the vehicle and causes the gas to discharge into the bag main body 11 from the gas generator opening 2 through the gas guide plate 2a likewise the embodiment of Fig. 1. At the time, when a crash occurs in a traveling direction, the occupant gets thrown out to the center of the inter-inflating-portion recess and received thereby as well as when a crash occurs so as to throw out the occupant in an oblique direction, he or she is received by a curved portion 18 between the inter-inflating-portion recess 15 and the annular inflating portion 11a therearound.

As described above, the occupant's body is not only protected against the crash simply in the traveling direction but also protected against a crash in which it

gets thrown out in the oblique direction, thereby there is an effect of satisfying the object of the present invention for preventing the occupant from being killed or injured likewise the embodiment shown in Fig. 1.

The embodiment of the apparatus of the present invention is by no means limited to the above two embodiments and any embodiment may be employed as long as it achieves the object of the present invention. That is, it is also possible to combine, for example, at least three main body bags of the above embodiments by appropriately disposing them right, left, up, and down so as to achieving an effect of protecting, for example, an occupant's head and knee and preventing an occupant's body from obliquely sliding down. Note that it is a matter of course from the spirit of the present invention that the apparatus of the present invention is not disposed only to an occupant in charge of drive and disposed to all the occupants.

When the airbag apparatus of the present invention is used, there can be obtained an outstanding effect in that not only vehicle occupant's bodies, which get thrown out by the crash of a vehicle in the traveling direction thereof, can be received by the airbag but also the vehicle occupant's bodies, which get thrown out in a front direction or in an oblique direction, can be received by the airbag so that the occupants can be prevented from being killed or

injured and in that the respective portions of the bodies can be protected against an accident because they are prevented from drop and slide.

In particular, since the opening of the gas generator, to which the bag is connected, is coupled with the rear portion of the bag through a less elastic extension member, a part of the rear portion of the bag is restrained by the extension member before the bag is completely inflated, and the gas discharged from the gas generator collides against the rear portion of the bag in this state, thereby the bag can be promptly inflated in a lateral direction so as to expand to a desired shape.

(57) CLAIM

1. A vehicle occupant protection airbag apparatus, characterized in that the opening of a gas generator to which a bag is connected is coupled with the rear portion of the bag through a less elastic extension member so that recessed portions and expanded portions are formed toward an occupant when the bag is inflated to thereby hold the body of the occupant in a traveling direction and an oblique direction.

(56) Cited Document

Japanese Patent Publication No. 48-32005